

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1488	membrane sam and layer	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:39
L2	120	I1 and mercapto	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:39
L3	25	I2 and derivatized	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:40
L4	0	I3 and mer capto derivatized	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:40
L5	25	I3 and mercapto derivatized	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:40
L6	0	I5 and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:42
L7	12	I5 and magnesium ammonium phosphate	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:47
L8	0	I5 and "magnesium ammonium phosphate"	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:47
L9	0	I1 and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:48
L10	1	sam adj membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:48
L11	0	I1 and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:48
L12	32	"magnesium ammonium phosphate" and membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:49
L13	5	I12 and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:52
L14	0	membrane and posively charged and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:53
L15	4	charged membrane and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:54

L16	0	"charged membrane" and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:55
L17	7546	"ion exchange membrane"	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:55
L18	0	I17 and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:55
L19	808	phosphate and I17	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:56
L20	471	I19 and ammonium	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:56
L21	180	I20 and magnesium	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:56
L22	0	I21 and "magnesium ammonium phosphate"	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:57
L23	0	"magnesium ammonium phosphate" and membrane and sulfonic acid	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:57
L24	0	"magnesium ammonium phosphate" and aryllic same membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:58
L25	0	"magnesium ammonium phosphate" and aryllic adj membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:58
L26	0	"magnesium ammonium phosphate" and acrylic membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:59
L27	0	"magnesium ammonium phosphate" and "acrylic membrane"	USPAT; EPO; DERWENT	AND	ON	2005/09/01 18:59
L28	0	struvite and acrylic adj membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 19:00
L29	20859	cation exchange and membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 19:00
L30	20859	I29 and membrane	USPAT; EPO; DERWENT	AND	ON	2005/09/01 19:00
L31	4	I29 and struvite	USPAT; EPO; DERWENT	AND	ON	2005/09/01 19:01

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L2: Entry 1 of 1

File: USPT

Feb 24, 1998

DOCUMENT-IDENTIFIER: US 5720882 A

TITLE: Treatment method for waste water sludge comprising phosphorous, heavy metals and at least one metal

Detailed Description Text (19):

The process of the invention has several alternative modes of operation. One interesting alternative, which greatly improves the recovery of nutrients i.e. phosphorus and ammonia of the waste water, is such that the metal sludge is formed by neutralizing the acidic hydrolysate with a Mg-compound. This has the effect that $MgNH_{4}PO_4 \cdot 6H_2O$ (struvite) will precipitate into the metal sludge reducing the content of ammonia in the hydrolysate. If Mg-compounds and possibly ammonia are properly used in all pH adjustments of the process so that the number of moles of ammonia equals to the number of moles of phosphorus corresponding to the mole ratio in $MgNH_4PO_4$, then after the final precipitation of $MgNH_4PO_4$ no ammonia will be left and none of it has to be returned to the waste water process. Hence all nutrients have been recovered. If only Mg-compounds have been used in pH adjustments the remaining filtrate solution contains primarily $MgSO_4$, which can be separated by evaporation and obtain a product of commercial value.

Detailed Description Text (30):

In this example NH_4OH was used for pH adjustment. Precipitation of heavy metals was performed at pH 4.0 using Na_2S -solution. The heavy metal precipitate contained 4% of the original phosphorus and 4% of the original aluminium. Next, pH was raised to level 5.4. The precipitate contained 24% of the original phosphorus and 63% of the original aluminium. After precipitation, MgO and NH_4OH were added to the solution and pH rose to 9.0. A $MgNH_4PO_4$ - precipitate (struvite) was obtained with about 70% of the original phosphorus and about 30% of the original aluminium. The mole ratio $[PO_4^{3-}] / [Al]$ was 6.0.

Detailed Description Text (46):

To an amount of 250 g of the filtrate solution from example 7, 5.32 g of $MgCl_2$ and 4 g of NH_4OH (25%) were added to precipitate P as $MgNH_4PO_4 \cdot 6H_2O$. The pH was adjusted to 9. The solution was filtrated yielding a cake with a dry weight of 3.55 g. The cake was analyzed by XRD and was identified as $MgNH_4PO_4 \cdot 6H_2O$ (struvite). The cake was dried to a dry weight of 3.55 g and analyzed. The dried cake contained 14% Mg, 4.5% NH_4 , and 20.8% P. The crystal water and half of the ammonia had evaporated during drying due to a too high temperature. The yield of P in this precipitation was 96.3%. The filtrate solution (246.5 g) contained <0.01% P.

Current US Original Classification (1):210/638[Previous Doc](#) [Next Doc](#) [Go to Doc#](#)

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Search History

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DB=USPT; PLUR=YES; OP=ADJ

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<u>L14</u>	L12 and liquid	344	<u>L14</u>
<u>L13</u>	L12 and liqud	0	<u>L13</u>
<u>L12</u>	L11 and chamber	403	<u>L12</u>
<u>L11</u>	cation exchange membrane and device	759	<u>L11</u>
<u>L10</u>	struvite crystals and membrane	4	<u>L10</u>
<u>L9</u>	struvite crystals and membrane	4	<u>L9</u>
<u>L8</u>	l6 and magnesium ammonium phosphate	0	<u>L8</u>
<u>L7</u>	L6 and struvite	0	<u>L7</u>
<u>L6</u>	L5 and phosphate	27	<u>L6</u>
<u>L5</u>	ion exchange membrane and l11	94	<u>L5</u>
<u>L4</u>	l2 and cation exchange	0	<u>L4</u>
<u>L3</u>	L2 and ion exchange	0	<u>L3</u>
<u>L2</u>	L1 and struvite	1	<u>L2</u>
<u>L1</u>	210/638.ccls.	814	<u>L1</u>

END OF SEARCH HISTORY